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ABSTRACT

This paper offers an analytical framework to evaluate the cost and potential economic benefits of industrial day care. The principal objectives of this analysis are to: define the inputs (goods and services) required to provide a given day care program; develop cost factors which can be used to estimate a range of costs for any particular type of day care; analyze the sensitivity of total costs to charges in program quality, size, and location; and reduce uncertainty among government, corporate, and private planners about the cost of adequate child care programs. The findings presented are based on a computer model, DAYCARE, which simulates the operation of a day care program and calculates the total cost under a wide range of assumptions. Two basic conclusions emerge. First, there is no one cost of day care; second, the cost of day care is highly sensitive to small changes in certain factors and relatively insensitive to changes in others. Included in the document are factors affecting day care costs, case studies, 10 computer outputs, day care program documentation, and the potential economic benefits of industrial day care. (BP)

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Potential Cost and Economic Benefits of Industrial Day Care

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October, 1971

A Report Prepared by the Inner City Fund for the U. S. Department of Labor

Employment Standards Administration

0E001656

This pamphlet is for general information and is not to be considered in the same light as official statements of position contained in Interpretative Bulletins and other such releases formally adopted and published in the Federal Register.

PREFACE

This paper offers an analytical framework to evaluate the cost and potential economic benefits of industrial day care -- child care provided by or paid for by a corporation for its employees. There is considerable uncertainty associated with both of these subjects. This paper attempts to reduce this uncertainty by specifying the precise nature of alternative day care programs and assessing their possible economic benefits.

The cost of day care varies with the size, quality, location, and efficiency of operation. The computer model presented in this paper simulates the cost of day care under a variety of assumptions about location, quality, and efficiency. It also analyzes the sensitivity of costs and profits to small changes in these factors.

A variety of alternatives are available to a corporation desiring to provide subsidized day care to its employees. For example, it could 1) develop and run its own center, 2) contract with an independent firm to operate its facilities, or 3) finance the cost of care arranged by each employee. Under each alternative, the corporation could agree to subsidize part or all of the cost depending on the employee's family income. The cost model presented in this paper should serve as a useful guide for the industrial day care planner regardless of the alternative finally selected.

The second section of this paper proposes an analytical framework to evaluate the economic benefits of subsidized corporate child care. Reliable data related to this issue are scarce and experimentation will be required before meaningful answers are available. Nevertheless, many factors which affect the potential economic benefits can be identified and quantified at this time. The model presented in the second section of this paper estimates the range of these factors and identifies the factors needed to estimate the potential economic benefits. As improved data become available, the reliability of the model will increase.

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ANALYZING THE COST OF DAY CARE

Introduction

There is considerable controversy about the true "cost" of day care for pre-school children. Estimates range from $800 to over $4,000 per child per year. * One of the basic problems is that there is little agreement about either the desired objectives (outputs) of day care or the characteristics of a quality child care program. To further complicate the situation, there is only limited and frequently contradictory information about the contribution of additional dollar and manpower resources to such things as child development, social well-being, and economic growth.

This paper proposes an analytical framework to analyze the cost of resources required to provide alternative day care programs without evaluating the quality of any particular program. The principal objectives of this analysis are to:

- define the inputs (goods and services) required to provide a given day care program;
- develop cost factors which can be used to estimate a range of costs for any particular type of day care;
- analyze the sensitivity of total costs to changes in program quality, size, and location; and
- reduce uncertainty among government, corporate, and private planners about the cost of "adequate" child care programs.

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* The Office of Economic Opportunity supported two studies related to the cost of day care. One study -- performed by Abt Associates -- examined twenty "exemplary" centers and calculated an average cost of $2,300 per child per year. This cost included an adjustment for prices, an imputed cost for in-kind donations and a calculation based on average annual attendance.

A study performed by Westinghouse Learning Corporation sampled 289 day care centers in fifty communities. The cost per child varied from an average of $456 per year in proprietary centers to $1,140 per year in non-proprietary centers.

The findings presented in this paper are based on a computer model, DAYCARE, which simulates the operation of a day care program. The model calculates the cost of care under a variety of assumptions about quality, program operation, location, and size. Because of its mathematical nature DAYCARE requires precise definition of the resources required to produce a given level of quality. Thus, for any agreed-upon set of inputs, the model calculates the total cost of the program.

In addition, the model will calculate the impact of small changes in these inputs on the total cost of the program. DAYCARE has been run under a wide range of assumptions about the type of care and the cost resources required to produce that level of quality. The results of these calculations are summarized below and presented in detail in Appendix II.

Summary of Findings

Two basic conclusions emerge. They are not at all surprising or unexpected but both are crucial in planning expanded day care programs.

First, there is no one cost of day care -- for the most part, you get what you pay for. The cost of two quality programs may vary significantly as a result of staff qualifications, geographical location, economies of scale, and management efficiency. Thus, it is not meaningful to discuss the cost of day care without first specifying the nature and location of the program.

Second, the cost of day care is highly sensitive to small changes in certain factors and relatively insensitive to changes in others. DAYCARE identifies these relationships and calculates the impact of small changes in the size, quality, or location of the program. For example, the annual cost per child is unusually sensitive to the pupil/teacher ratio, the quality of professional staff, the efficient utilization of resources, and the economies of large scale operation. In some cases:

- a reduction in the pupil/teacher ratio from 7:1 to 4:1 will increase the cost per child by 30%

- heavy reliance on certified teachers rather than less-educated para-professionals can easily double the cost per child

- inefficient utilization of capacity can increase costs appreciably. The annual cost per child can be reduced 10-15% by increasing the enrollment rate from 80% to 95%.

- there appear to be reasonable economies associated with large-scale operation. Increasing capacity from 60 to 100 children would reduce the cost per child by approximately 7-10%.

Costs appear relatively insensitive to several factors frequently considered essential to quality child care. For example,

- a 50% increase in the cost of food may not cause more than a 3-4% increase in the annual cost per child

- the cost of program materials, books, and supplies are generally an insignificant percentage of the total

- the annual cost per child is not significantly affected by changes in the construction cost of facilities --- a 50% increase in the construction cost per square foot would increase the annual cost per child less than 3%.

A Word of Caution

Like all mathematical approximations, DAYCARE makes a number of simplifying assumptions which require careful interpretation. The findings of this paper must be considered in light of these factors. For example:

- the model is a static annual program. It can not accommodate a dynamic growth situation where expenses, enrollment, and capacity fluctuate over time. However, growth can be approximated by changing the input variables and rerunning the model for each additional year required.

- DAYCARE can not evaluate "quality" except as translated into dollar terms. For example, it cannot distinguish between the value of one good and one mediocre teacher each of which is paid $7,000. It cannot evaluate two types of education equipment that cost the same amount.

.. DAYCARE can vary program operation only within certain ranges. For example, it can alter the child/staff ratio but it cannot change the number of hours of care provided. It can vary the size of the center or the number of children per class, but it cannot incorporate half-day or summer programs.

.. In its present form, the model cannot accommodate the cost of facilities which are leased rather than constructed or renovated. However, the model could be modified to account for leased facilities if required.

A Day Care Cost Simulation Model

DAYCARE is a computer-based model which simulates the operation of day care programs. It is most applicable to group day care provided in fairly large centers (over 20 children), but it can also be used to evaluate in-home and family care. The model enables planners and potential investors to calculate systematically the cost of day care under a variety of assumptions about size, quality,and location.

DAYCARE operates from the perspective of a day care center operator and uses accounting data which would normally be produced through day to day program operation. DAYCARE can be used to make the following determinations:

.. the economies of large-scale operation;

.. the impact of alternative staffing patterns on the annual cost per child;

- .. the cost of improving quality by increasing the experience or education level required for the teaching staff;
- .. the tradeoffs between higher tuitions and lower enrollment rates;
- .. the effect of geographical price index changes;
- .. the effect, on total costs and assets, of changes in the size and quality of administrative and classroom facilities;
- .. the optimum center capacity for a given market area and program quality;
- .. the sensitivity of the cost per child to changes in such factors as child/staff ratios, enrollment rates, and fixed costs.

DAYCARE is designed to focus debate on the desired goals and quality of child care programs rather than the cost to produce them. In addition, it attempts to enable day care planners to calculate the cost of similar programs under slightly different assumptions or in different geographical locations.

DAYCARE Logic. The logic of the DAYCARE model is relatively simple. It simulates the operation of a child care facility for one year, and -- under a variety of assumptions about quality, size, and location -- it calculates the annual cost of operation. The model is composed of four basic components.

Capital Investment Factors. Seven factors are required to estimate the capital investment cost of a day care center: 1) the classroom space required per child; 2) the ratio of administrative space to total classroom space; 3) the construction cost per square foot for a given type of facility; 4) the number of acres of land required per center; 5) the cost per acre; 6) the initial cost to equip the center; and 7) a variety of other startup costs such as planning, market surveys, landscaping, and miscellaneous fees and taxes.

Fixed Operating Costs. Some costs of operating a day care center are fixed; within reasonable ranges, they will not vary with changes in the number of classrooms, children enrolled, or the quality of care provided. For example, a day care center with 20-30 children

probably requires the services of a full-time director and clerical personnel. These costs will be incurred whether or not ten additional children are enrolled in the center. Property taxes and legal fees are also relatively independent of the number of children enrolled.

Classroom Variables. Many costs of operating a day care center vary primarily with the total number of classrooms. For example, the total number of teachers required in a facility depends on the number of classrooms, the children per class, and the desired pupil/teacher ratio. As the number of classrooms is increased to provide additional capacity, the center must hire new teachers to staff each class at the desired ratio. In addition to teacher salaries, the number of classrooms will affect such things as the size and cost of the facility, the equipment required, maintenance costs, and a variety of other factors.

Child Variables. Finally, some costs vary primarily with the number of children enrolled in the center. For example, the annual cost of food, medical and dental services, consumable materials, and insurance vary with the total number of children -- the higher the enrollment rate the higher the total cost. Finally, the revenue-generating capacity of a day care center is determined by the number of children actually enrolled and the annual tuition charged for various types of services.

Sensitivity Analysis. The DAYCARE model calculates the sensitivity of day care costs to changes in the size and quality of the program. The model calculates the effect of changes in factors such as pupil/teacher ratios, center capacity, teacher salary costs, enrollment rates, and fixed expenses. For example, to calculate the cost implications of changes in the number of classrooms and the enrollment rate, DAYCARE would produce a series of matrices similar to the one shown below.

The model will produce a different matrix reflecting the impact of changes in these variables for each of fourteen factors (such as sales, total cost per child, profit after taxes, and capital investment required). The matrix shows the effect on annual cost per child of varying enrollment rate from 80% to 100% of capacity and the number of classrooms (twenty children per class) from one to nine. This example shows that, while

holding all other factors constant in a one-classroom center, a 20% increase in the enrollment rate will decrease the cost per child by 17% (from $2,410 to $1,990 per child per year) as a result of more efficient utilization of facilities. Increasing the center capacity from one classroom (20 children) to nine classrooms (180 children) decreases the annual cost per child from $2,400 to $1,340 as a result of economies of scale.

Annual Cost Per Child
($000's)

Number of Classrooms	Enrollment Rate (% capacity)				
	.80	.85	.90	.95	1.00
1	2.41	2.29	2.18	2.08	1.99
3	1.61	1.53	1.46	1.40	1.35
5	1.45	1.38	1.32	1.27	1.22
7	1.38	1.32	1.26	1.21	1.16
9	1.34	1.28	1.23	1.18	1.13

This example illustrates one principal finding of this paper --the cost of day care is highly sensitive to small changes in certain factors. In this case, the annual cost per child, for the same quality program, increased from $1,130 (assuming full utilization of capacity and large-scale operation) to $2,410 (operating under capacity on a small scale). The DAYCARE model indicates that costs are particularly sensitive to changes in 1) the scale of operation, 2) the average enrollment rate, 3) the pupil/teacher ratio, and 4) the skill-level of the teaching staff (as reflected by annual salaries). Costs are relatively insensitive to the cost of program materials, food and medical services, construction costs, and interest rates.

Inputs Required. The DAYCARE model requires careful definition of the characteristics of the desired center. However, important variables can be specified in terms of a range of values and DAYCARE will automatically simulate the impact of these changes on cost and profits. Any two factors may be varied during one run of the model while the remainder are held constant. All factors may be changed from one run to the next. The DAYCARE data inputs are described in detail in Appendix II, and the principal variables are discussed briefly below.

Pupil/teacher ratio. One of the key factors affecting the cost of day care is the cost of professional and para-professional teacher salaries. In fact, salaries frequently account for 50-75% of annual operating costs. Two basic factors affect teacher salaries: 1) the child/staff ratio; and 2) the salary ranges for professional and para-professional teachers.

There are numerous combinations of teacher quality (as reflected by salary level) and quantity (the ratio of children to staff) for any given total of professional salaries. For example, in a classroom with twenty children, it is possible to spend a total of $12,000 either by hiring one child development Ph.D. (a child/staff ratio of 20:1) or by hiring three para-professional aides for $4,000 each (a 7:1 ratio). A wide variety of such staffing tradeoffs are possible.

The DAYCARE model avoids the controversy surrounding these tradeoffs by calculating the total staff cost per class rather than the pupil/teacher ratio or some arbitrary measure of teacher quality. For a given number of children per class, the model requires estimates of the total cost of staff salaries for that class. For example, in a class of 20 children, DAYCARE might compute the impact of total salaries ranging from $8,000 to $24,000. Assuming one head teacher is paid $8,000 and each of three aides are paid $4,000 per year, these salaries equate to child/staff ratios of 4:1 to 20:1 respectively. On the other hand, the child/staff ratios could be reduced to 3:1 for the same total cost, by hiring only para-professional aides at $3,500 per year.

DAYCARE requires each planner to consider tradeoffs between staff quality and quantity. Given these tradeoffs, the model calculates their impact on costs and profits.

Children per classroom. The model allows the day care planner to design any size classroom desired. Most classrooms hold five to twenty children, although some centers have large open spaces which accommodate larger numbers of children organized into special activity groups. Most of the examples shown in this paper use twenty children for ease of illustration.

Tuition. DAYCARE can utilize any tuition expressed in thousands of dollars per child per year. However, it can not compute revenues based on sliding or variable fee structures. In the event that fee schedules are desired, the planner should estimate the average tuition per child per year.

Enrollment rate. The model requires an estimate of the average percentage of capacity that will actually be filled during the year.

Fixed expenses. DAYCARE allows the planner to vary estimates of fixed salaries and expenses over any conceivable range. The composition and range of these expenses are discussed in detail in Appendix I.

Outputs Possible. DAYCARE calculates a wide variety of statistical outputs. For each run (which varies two major factors), DAYCARE will compute any of the following: total sales; fixed costs; child-related costs; class-related costs; total costs (before taxes); the annual cost per child; profit before and after taxes; net cash flow; total assets; total capital investment; and return on sales, assets, and invested capital. Each of these outputs is printed as a 5 x 5 matrix whose columns and rows are determined by the choice of the two independent variables in each run.

DAYCARE offers two output formats -- 1) a short form which shows total sales, costs, profit after taxes, total assets, and the cost per child, and 2) a long form which calculates all fourteen output variables. Examples of both formats are shown in Appendix II.

CASE STUDY

One complete run of the DAYCARE model is shown on the following page. Two factors have been selected for analysis: 1) the staff cost per class (20 children) varies from $8,000 to $24,000, and 2) the tuition per child varies from $800 to $2,000 per year. All dollar values are shown in thousands of dollars.

The center analyzed in this example has five classrooms and a capacity for one hundred children. The center contains 3,850 square feet of space (3,500 classroom and 350 adminstrative) which cost $16 per square foot to construct. An average of 90 children are enrolled during the year and they have an attendance rate of 90%. Each classroom is equipped with $1,000 of equipment and supplies, and an additional $800 will be consumed per classroom per year. Each child is provided one meal and two snacks ($0.65 per day), $50 worth of medical services, $10 for special clothing, and $100 for miscellaneous services (social or other services). Three quarters of the fixed investment has been financed at a simple interest rate of 9%.

- annual revenues range from $72,000 to $180,000 depending on tuition

- total costs vary significantly as a function of the staff cost per classroom. Remember that $12,000 per class could provide one Ph.D. (a 20:1 pupil/teacher ratio) or three para-professionals (a 7:1 ratio)

- Profit after taxes varies from a loss of $111,780 (low tuition and high staff costs) to a profit of $46,080 (high tuition and few teachers). The profit matrix indicates the tradeoffs between tuition and staff.

- the total assets required for this center vary from $116,000 to $123,000, primarily as a result of the additional working capital required to support a larger staff.

- The annual cost per child ranges from $1,100 to $1,990 as a result of increased expenditures for a larger or more qualified teaching staff.

KEY TO ASSUMPTIONS

The following section shows the principal cost and operating assumptions used in this sample run. The assumptions used in each run are always printed, in the order shown below, at the end of the output section.

1.	10%	Ratio of administrative space required to classroom space planned
2.	35	Number of square feet of classroom space per child
3.	1.5	Number of acres of land required
4.	$1,000	Capital investment cost to equip one classroom
5.	$5,000	Miscellaneous start-up costs (planning, taxes, fees, etc).
6.	$15,000	Fixed salaries (Director, secretarial, etc.)
7.	$800	Cost of equipment consumed per class per year
8.	$600	Maintenance costs per class per year
9.	0	Teacher training costs per class per year
10.	0	Other expenses that are a function of classrooms
11.	$160	Cost of food per child per year
12.	$50	Medical costs per child per year
13.	$10	Clothing costs per child per year
14.	$100	Miscellaneous costs per child per year
15.	24%	Tax rate for profits under $25,000
16.	48%	Tax rate for profits over $25,000
17.	10%	Depreciation rate of fixed capital
18.	20	Number of students per classroom
19.	9%	Interest rate charged on borrowed funds
20.	8%	Working capital as a percentage of total costs
21.	0	Fixed cost to purchase existing facility
22.	$16	Construction cost per square foot
23.	$25,000	Cost per acre of land
24.	$5,000	Fixed annual expenses
25.	$8,000	Staff cost per classroom
26.	$800	Annual tuition per child
27.	90%	Average attendance rate
28.	5	Number of classrooms
29.	90%	Average enrollment rate
30.	75%	Ratio of debt to total assets (%)

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TCH CST/CLAS	TUITION PER STUDENT				
	0.800	1.100	1.400	1.700	2.000
		SALES($000)			
8.000	72.00	99.00	126.00	153.00	180.00
12.000	72.00	99.00	126.00	153.00	180.00
16.000	72.00	99.00	126.00	153.00	180.00
20.000	72.00	99.00	126.00	153.00	180.00
24.000	72.00	99.00	126.00	153.00	180.00
		TOTAL COSTS			
8.000	98.80	98.80	98.80	98.80	98.80
12.000	118.90	118.90	118.90	118.90	118.90
16.000	139.01	139.01	139.01	139.01	139.01
20.000	159.12	159.12	159.12	159.12	159.12
24.000	179.23	179.23	179.23	179.23	179.23
		PROFIT AFTER TAXES			
8.000	-30.92	-3.92	17.54	38.04	46.08
12.000	-51.14	-24.14	2.18	21.53	35.57
16.000	-71.35	-44.35	-17.35	7.33	25.06
20.000	-91.57	-64.57	-37.57	-10.57	12.49
24.000	-111.78	-84.78	-57.78	-30.78	-3.78
		TOTAL ASSETS			
8.000	116.67	116.67	116.67	116.67	116.67
12.000	118.27	118.27	118.27	118.27	118.27
16.000	119.87	119.87	119.87	119.87	119.87
20.000	121.47	121.47	121.47	121.47	121.47
24.000	123.07	123.07	123.07	123.07	123.07
		COST PER CHILD			
8.000	1.10	1.10	1.10	1.10	1.10
12.000	1.32	1.32	1.32	1.32	1.32
16.000	1.54	1.54	1.54	1.54	1.54
20.000	1.77	1.77	1.77	1.77	1.77
24.000	1.99	1.99	1.99	1.99	1.99

ASSUMPTIONS

0.1900	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0600
0.0	0.0160	25.0000			
5.0000					
8.0000					
0.8000	0.9000				
5.0000	0.9000	0.7500			

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Appendix I

Factors Affecting DAYCARE Costs

This section describes the range of cost factors used in the DAYCARE model. These factors vary with geographical location, quality, and scale of operation.

Data Sources

Most of the information presented in this section was developed under contract with the Office of Economic Opportunity by Abt Associates and Westinghouse Learning Corporation. These two studies are described briefly below.

Abt Associates The Abt study analyzed in depth twenty exemplary day care centers. All but one center was nonproprietary and offered high quality developmental programs. The average cost of these programs was high relative to the national norms.

Westinghouse Learning Corp. This study was designed to estimate national supply and demand for day care. The survey was based on an unbiased national sample of 50 communities, 289 center operators, 130 family day care homes, 1,800 area-sampled users, 570 parents, and 1,200 mail interviews of school officials.

Other data sources have also been used and are cited appropriately below.

Cost Factors

The following sections estimate ranges for the principal cost factors in the DAYCARE model. These factors may be useful in estimating the cost of any particular program.

Total Cost Per Child. The Abt study computed an average annual cost per child of $2,300 ($1.13 per hour). This calculation included an adjustment for geographical price variations and an imputed price for in-kind donations. The cost was based on average attendance rather than enrollment. Abt estimates that--- excluding in-kind donations, transportation and other supplemental services, and using enrollment rather than attendance--- the annual cost per child is $1,430. Finally, the Abt study indicated wide cost variation among quality centers--- from $1,200 to $4,100 per child per year.

The Westinghouse Learning Corporation survey estimated costs considerably below the Abt exemplary centers. This survey did not impute a price for in-kind donations and calculated costs based on average enrollment. Annual costs per child ranged from an average of $456 in proprietary centers to $1,140 in nonproprietary centers. These two costs are not entirely comparable because the cost of nonproprietary centers includes the cost of management which is most likely not included in the cost of proprietary centers.

Staff Costs. The Abt study indicated that personnel salaries and benefits account for 65% of the total--- 47% for teaching and care of children and 18% for administration. Most day care operators estimate personnel costs represent 50-75% of the annual cost per child. Obviously, the number and quality of teachers and the specific staffing patterns used will have a major impact on the total cost. The following table shows average salaries in current dollars paid to elementary and secondary public school teachers since 1955. The average cost doubled in fifteen years, from $3,816 in 1955 to $7,908 in 1969.

Average Public School Salaries
($)

	All Teachers	Elementary Teachers	Secondary Teachers
1955	3816	3615	4194
1960	4995	4815	5276
1965	6195	5985	6451
1969	7908	7676	8160

Source: Statistical Abstract of the United States; 1969.

The following table indicates the wide price variations that occur as a result of geographical location. Starting salaries vary from a low of $6,210 in the Southeast to a high of $7,307 in the Mideast.

MINIMUM SCHEDULED SALARIES FOR TEACHERS WITH B. A. DEGREES

Region	1966-67	1968-69	1970-71
New England	5329	6117	7182
Mideast	5423	6285	7307
Southeast	4609	5411	6210
Great Lakes	5355	6287	7262
Plains	5151	6058	6924
Southwest	4860	5506	6532
Rocky Mountain	5023	5580	6328
Far West	5645	6321	7062
Average, All Regions	5144	5941	6850

SOURCE = NEA Research Bulletin, Vol-49, Number 1, March 1971, p. 13

The following table shows salary variation by type of degree. In the 1970-71 school year, the average teacher with a bachelors degree earned $6,850 compared to $8,712 for a teacher with a doctoral degree.

Minimum Scheduled Salaries for Teachers
($)

Degree Level	1966-67	1968-69	1970-71
Bachelor	5,144	5,941	6,850
Master	5,600	6,546	7,599
Doctoral	6,350	7,471	8,712

Source: NEA Research Bulletin, Vol. 49, Number 1, March 1971, p. 11

On the other hand, the Westinghouse study indicates that day care staff are paid considerably less than elementary and secondary school teachers. Westinghouse estimates there are about 127,000 paid day care staff personnel; 60% are full-time employees and 80% are in child-related activities. In addition, there are about 5,000 volunteer staff. Educational qualifications of day care personnel are generally low--- two thirds have a high school degree, 6% did not finish high school, and 27% are college graduates. The median age of staff is 36 years and only 3% are over 65.

Salaries are low compared to public school teachers--- the median salary for day care staff was $4300 per year. In spite of these relatively low salaries, about 70% of the day care operators interviewed in the Westinghouse study reported little or no difficulty hiring staff.

Construction Costs. The following table indicates, first, that construction costs vary significantly depending on the type of building, and second, that construction costs increased rapidly during the 1960's. Average costs for all types of construction increased 17% in eight years, from $16.86 per square foot in 1960 to $19.73 per square foot in 1968. The cost of public buildings increased almost 40% during the period. Construction costs in 1968 ranged from a low of $13.27 per foot for industrial space to a high of $30.64 for hospital construction.

The cost of day care facilities will vary significantly depending on the type building and the location. However, most centers will probably range from $15 to $25 per square foot.

Construction Cost per Square Foot[1/]
(dollars per foot)

	1960	1965	1968
Nonresidential buildings			
Commercial [2/]	13.16	13.15	15.41
Industrial	11.87	11.56	13.27
Educational and science	15.33	18.50	22.85
Hospital	23.11	25.25	30.64
Public buildings	20.57	23.38	28.51
Religious	14.88	17.40	18.95
Social/recreational	14.34	17.02	20.73
Miscellaneous	14.96	15.68	16.92
Residential buildings	11.61	12.41	13.24
Total	11.86	17.33	19.73

1/ excludes floor space of public works and utilities, data for which are not available.

2/ includes non-industrial warehouses

Source: F.W. Dodge Division, Mc Graw-Hill Information Systems Company.

Land costs. The price of land varies dramatically by location. Rural acreage can be purchased for a few hundred dollars while land in large metropolitan areas frequently costs hundreds of thousands of dollars per acre. Each site requires a different estimate based on prevailing market prices.

Period of Operation. Each center must decide whether or not to remain open during the summer months. The period of operation will effect the annual cost per child. The following table indicates that almost 89% of the existing centers operate twelve months each year.

Months of Center Operation

Months open per year	Number Centers	% of Total
9	1,151	6.6
10	369	2.7
11	478	2.7
12	15,547	88.6
Total	17,545	100.0

Source: Westinghouse Learning Study

Type Facilities Available. The cost of day care will be affected by the amount and quality of special facilities available. The following table shows the types of facilities frequently provided and the percentage of existing centers that provide them.

Type Facility	Percentage Available
Electric fire alarm	16
Manual fire alarm	30
Fire extinquishers	95
Administrative offices	71
Classrooms	91
Medical isolation space	84

Source: Westinghouse study

Equipment: The following table shows the percentage of centers that provide special types of equipment and the average replacement value per center.

Type of Equipment	Percent Available	Average Cost Per Center ($)
Indoor exercise Equipment	83	257
Equipment for quiet play	98	250
Art work	96	189
Toys	95	217
Musical equipment	92	344
Outdoor equipment	94	492
Science equipment	58	144
Cots, cribs, mats	97	423
Audiovisual equipment	86	415
Other special equipment	27	349

Source: Westinghouse study

Medical and Other Services. The following table shows the percentage of centers offering health and other types of special services. It also shows the funding source when services are provided. Three quarters of the existing centers provide no ancillary services and only 2-3% of those that do include it as part of the annual tuition.

Type Service	Not Available	Included in fee	Extra Charge	Outside Sources	Other
Physical exams	77%	2%	2%	13%	4%
Dental exams	80	1	1	14	3
Vision tests	68	3	1	15	10
Speech tests	81	2	2	9	5
Hearing tests	75	3	1	12	7
Psychological tests	80	2	-	11	6
Social services	75	3	-	17	3

Food. Most centers provide one or more meals and snacks to children during the day. The following table shows that 96% of the centers provide lunch, 40% serve breakfast, 5% offer dinner, and almost all provide an afternoon snack. About 95% of the centers prepare meals in their own kitchens. The cost of providing one meal and two snacks varies from $100 to $200 per child per year depending on quality and method of preparation.

Meal Provided	Percent of Centers
Breakfast	39.9
Lunch	96.5
Dinner	5.4
Afternoon snack	96.3

Fixed Salaries. The size and composition of fixed salaries will vary widely among centers. A competent center director will cost $8,000 to $20,000 depending on experience and quality. An associate director will probably cost $5,000 to $10,000. Clerical help will vary between $5,000 and $9,000 per year. Any other professional salaries (such as medical, psychological and social services) should be included in this category. The following table shows average annual salaries paid to administrative and support personnel in elementary and secondary schools.

Average Salaries Paid to Administrative and Support Personnel
($)

Type Position	1966-67 School Year
Elementary school principals	12,009
Senior high school principals	13,692
Elementary school assistant principals	10,936
Senior high school assistant principals	11,642
Superintendents	31,756
Associate superintendents	25,370
Guidance counselors	9,524
Librarians	7,548
Nurses	7,134
Social Workers	8,487
Psychologists and Psychometrists	9,660

Source: 23rd Biennial Salary Survey of Public School Professional Personnel; National Education Association; Report 1967-R12.

Fixed Expenses. Any fixed costs, other than salaries, should be included in the fixed expense category. This category should include such things as telephone charges, advertising, administrative office supplies, insurance, and legal/accounting fees.

Appendix II

This section shows detailed output data from ten runs of the DAYCARE model. As a guide to this section, a brief summary of these runs is shown below. A key to the assumptions used in each run is shown on the following page.

Short Output Format	Major Cost Variables
#1	Enrollment rate and teacher cost per class
#2	Classrooms and teacher cost per class
#3	Tuition and teacher cost per class
#4	Enrollment rate and classrooms
#5	Enrollment rate and tuition
#6	Classrooms and tuition
#7	Tuition and construction cost

Long Output Format	
#8	Classrooms and teacher cost per class
#9	Enrollment rate and teacher cost per class
#10	Tuition and teacher cost per class

Key To Assumptions

1.	2.	3.	4.	5.	
6.					
7.	8.	9.	10.		
11.	12.	13.	14.		
15.	16.	17.	18.	19.	20.
21.	22.	23.			
24.					
25.					
26.	27.				
28.	29.	30.			

1. Ratio of administrative space required to classroom space planned (%)
2. Number of square feet of classroom space per child.
3. Number of acres of land required.
4. Capital investment cost to equip one classroom.
5. Miscellaneous start-up costs (planning, taxes, fees, etc.).
6. Fixed salaries (Director, secretarial, etc.).
7. Cost of equipment consumed per class per year.
8. Maintenance costs per class per year.
9. Teacher training costs per class per year.
10. Other expenses that are a function of classrooms.
11. Cost of food per child per year.
12. Medical costs per child per year.
13. Clothing costs per child per year.
14. Miscellaneous costs per child per year.
15. Tax rate for profits under $25,000.
16. Tax rate for profits over $25,000.
17. Depreciation rate of fixed capital.
18. Number of students per classroom.
19. Interest rate changed on borrowed funds.
20. Working capital as a percentage of total costs.
21. Fixed cost to purchase existing facility.
22. Construction cost per square foot.
23. Cost per acre of land.
24. Fixed annual expenses.
25. Staff cost per classroom.
26. Annual tuition per child
27. Average attendance rate.
28. Number of classrooms
29. Average enrollment rate.
30. Ratio of debt to total assets (%).

Run #1

ENROLL RATE

TCH CST/CLAS	0.800	0.850	0.900	0.950	1.000
SALES					
8.000	136.00	144.50	153.00	161.50	170.00
12.000	136.00	144.50	153.00	161.50	170.00
16.000	136.00	144.50	153.00	161.50	170.00
20.000	136.00	144.50	153.00	161.50	170.00
24.000	136.00	144.50	153.00	161.50	170.00
TOTAL COSTS					
8.000	95.90	97.35	98.80	100.24	101.69
12.000	116.01	117.46	118.90	120.35	121.80
16.000	136.12	137.56	139.01	140.46	141.91
20.000	156.22	157.67	159.12	160.57	162.01
24.000	176.33	177.78	179.23	180.68	182.12
PROFIT AFTER TAXES					
8.000	24.71	28.33	32.04	35.70	39.37
12.000	11.99	17.34	21.53	25.19	28.35
16.000	-4.44	1.98	7.33	12.69	18.04
20.000	-24.66	-17.61	-10.57	-3.52	2.63
24.000	-44.87	-37.83	-30.78	-23.74	-16.70
TOTAL ASSETS					
8.000	116.44	116.56	116.67	116.79	116.90
12.000	118.04	118.16	118.27	118.39	118.50
16.000	119.64	119.76	119.87	119.99	120.10
20.000	121.24	121.36	121.47	121.59	121.70
24.000	122.84	122.96	123.07	123.19	123.30
COST PER CHILD					
8.000	1.20	1.15	1.10	1.06	1.02
12.000	1.45	1.38	1.32	1.27	1.22
16.000	1.70	1.62	1.54	1.48	1.42
20.000	1.95	1.85	1.77	1.69	1.62
24.000	2.20	2.09	1.99	1.90	1.82

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
8.0000					
1.7000	0.9000				
5.0000	0.8000	0.7500			

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Run #2

CLASS ROOMS

TCH CST/CLAS	3.000	4.000	5.000	6.000	7.000
SALES					
8.000	91.80	122.40	153.00	183.60	214.20
12.000	91.80	122.40	153.00	183.60	214.20
16.000	91.80	122.40	153.00	183.60	214.20
20.000	91.80	122.40	153.00	183.60	214.20
24.000	91.80	122.40	153.00	183.60	214.20
TOTAL COSTS					
8.000	66.97	82.83	98.80	114.71	130.62
12.000	79.03	98.97	118.90	133.84	158.77
16.000	91.10	115.05	139.01	162.97	186.93
20.000	103.16	131.14	159.12	187.10	215.08
24.000	115.23	147.23	179.23	211.23	243.23
PROFIT AFTER TAXES					
8.000	17.23	24.91	32.04	39.17	46.30
12.000	8.01	15.35	21.53	26.55	31.58
16.000	-1.59	3.06	7.33	11.60	15.87
20.000	-13.72	-12.15	-10.57	-8.99	-7.41
24.000	-25.85	-23.32	-30.78	-33.25	-35.72
TOTAL ASSETS					
8.000	87.64	102.16	116.67	131.19	145.70
12.000	88.60	103.44	118.27	133.11	147.94
16.000	89.56	104.72	119.87	135.03	150.18
20.000	90.52	106.00	121.47	136.95	152.42
24.000	91.48	107.28	123.07	138.87	154.66
COST PER CHILD					
8.000	1.24	1.15	1.10	1.06	1.04
12.000	1.46	1.37	1.32	1.29	1.26
16.000	1.69	1.60	1.54	1.51	1.48
20.000	1.91	1.82	1.77	1.73	1.71
24.000	2.13	2.04	1.99	1.96	1.93

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
8.0000					
1.7000	0.9000				
3.0000	0.9000	0.7500			

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Run #3

TCH CST/CLAS	TUITION 0.800	1.100	1.400	1.700	2.000
		SALES			
8.000	72.00	99.00	126.00	153.00	180.00
12.000	72.00	99.00	126.00	153.00	180.00
16.000	72.00	99.00	126.00	153.00	180.00
20.000	72.00	99.00	126.00	153.00	180.00
24.000	72.00	99.00	126.00	153.00	180.00
		TOTAL COSTS			
8.000	98.80	98.80	98.80	98.80	98.80
12.000	118.90	118.90	118.90	118.90	118.90
16.000	139.01	139.01	139.01	139.01	139.01
20.000	159.12	159.12	159.12	159.12	159.12
24.000	179.23	179.23	179.23	179.23	179.23
		PROFIT AFTER TAXES			
8.000	-30.92	-3.92	17.54	32.04	46.08
12.000	-51.14	-24.14	2.18	21.53	35.57
16.000	-71.35	-44.35	-17.35	7.33	25.06
20.000	-91.57	-64.57	-37.57	-10.57	12.49
24.000	-111.78	-84.78	-57.78	-30.78	-3.78
		TOTAL ASSETS			
8.000	116.67	116.67	116.67	116.67	116.67
12.000	118.27	118.27	118.27	118.27	118.27
16.000	119.87	119.87	119.87	119.87	119.87
20.000	121.47	121.47	121.47	121.47	121.47
24.000	123.07	123.07	123.07	123.07	123.07
		COST PER CHILD			
8.000	1.10	1.10	1.10	1.10	1.10
12.000	1.32	1.32	1.32	1.32	1.32
16.000	1.54	1.54	1.54	1.54	1.54
20.000	1.77	1.77	1.77	1.77	1.77
24.000	1.99	1.99	1.99	1.99	1.99

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
8.0000					
0.8000	0.9000				
5.0000	0.9000	0.7500			

Run #4

CLASS ROOMS	ENROLL RATE 0.800	0.850	0.900	0.950	1.000
	SALES				
1.000	27.20	28.90	30.60	32.30	34.00
3.000	81.60	86.70	91.80	96.90	102.00
5.000	136.00	144.50	153.00	161.50	170.00
7.000	190.40	202.30	214.20	226.10	238.00
9.000	244.80	260.10	275.40	290.70	306.00
	TOTAL COSTS				
1.000	38.58	38.87	39.16	39.45	39.74
3.000	77.30	78.16	79.03	79.90	80.77
5.000	116.01	117.46	118.90	120.35	121.80
7.000	154.72	156.75	158.77	160.80	162.83
9.000	193.43	196.04	198.64	201.25	203.86
	PROFIT AFTER TAXES				
1.000	-11.61	-10.20	-8.79	-7.38	-5.97
3.000	1.58	4.80	8.01	11.22	14.43
5.000	11.99	17.34	21.53	25.19	28.85
7.000	21.32	26.45	31.58	36.71	41.84
9.000	28.44	35.03	41.63	48.22	54.82
	TOTAL ASSETS				
1.000	58.89	58.91	58.93	58.96	58.98
3.000	88.47	88.53	88.60	88.67	88.74
5.000	118.04	118.16	118.27	118.39	118.50
7.000	147.62	147.78	147.94	148.10	148.27
9.000	177.20	177.41	177.61	177.82	178.03
	COST PER CHILD				
1.000	2.41	2.29	2.18	2.08	1.99
3.000	1.61	1.53	1.46	1.40	1.35
5.000	1.45	1.33	1.32	1.27	1.22
7.000	1.38	1.32	1.26	1.21	1.16
9.000	1.34	1.28	1.23	1.18	1.13

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
12.0000					
1.7000	0.9000				
1.0000	0.8000	0.7500			

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Run #5

ENROLL RATE

TUITION	0.800	0.850	0.900	0.950	1.000
SALES					
0.800	64.00	68.00	72.00	76.00	80.00
1.100	88.00	93.50	99.00	104.50	110.00
1.400	112.00	119.00	126.00	133.00	140.00
1.700	136.00	144.50	153.00	161.50	170.00
2.000	160.00	170.00	180.00	190.00	200.00
TOTAL COSTS					
0.800	116.01	117.46	118.90	120.35	121.80
1.100	116.01	117.46	118.90	120.35	121.80
1.400	116.01	117.46	118.90	120.35	121.80
1.700	116.01	117.46	118.90	120.35	121.80
2.000	116.01	117.46	118.90	120.35	121.80
PROFIT AFTER TAXES					
0.800	-56.23	-53.68	-51.14	-48.59	-46.05
1.100	-32.23	-28.18	-24.14	-20.09	-16.05
1.400	-8.23	-2.68	2.18	6.39	10.60
1.700	11.99	17.34	21.53	25.19	28.85
2.000	26.68	31.13	35.57	40.01	44.45
TOTAL ASSETS					
0.800	118.04	118.16	118.27	118.39	118.50
1.100	118.04	118.16	118.27	118.39	118.50
1.400	118.04	118.16	118.27	118.39	118.50
1.700	118.04	118.16	118.27	118.39	118.50
2.000	118.04	118.16	118.27	118.39	118.50
COST PER CHILD					
0.800	1.45	1.38	1.32	1.27	1.22
1.100	1.45	1.38	1.32	1.27	1.22
1.400	1.45	1.38	1.32	1.27	1.22
1.700	1.45	1.38	1.32	1.27	1.22
2.000	1.45	1.38	1.32	1.27	1.22

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
12.0000					
0.8000	0.9000				
5.0000	0.8000	0.7500			

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Run #6

CLASS ROOMS

TUITION	1.000	3.000	5.000	7.000	9.000
		SALES			
0.800	14.40	43.20	72.00	100.80	129.60
1.100	19.80	59.40	99.00	138.60	178.20
1.400	25.20	75.60	126.00	176.40	226.80
1.700	30.60	91.80	153.00	214.20	275.40
2.000	36.00	108.00	180.00	252.00	324.00
		TOTAL COSTS			
0.800	39.16	79.03	118.90	158.77	198.64
1.100	39.16	79.03	118.90	158.77	198.64
1.400	39.16	79.03	118.90	158.77	198.64
1.700	39.16	79.03	118.90	158.77	198.64
2.000	39.16	79.03	118.90	158.77	198.64
		PROFIT AFTER TAXES			
0.800	-24.99	-38.06	-51.14	-64.21	-77.28
1.100	-19.59	-21.86	-24.14	-26.41	-28.68
1.400	-14.19	-5.66	2.18	8.66	15.14
1.700	-8.79	8.01	21.53	31.58	41.63
2.000	-3.39	19.90	35.57	51.23	66.90
		TOTAL ASSETS			
0.800	58.93	88.60	118.27	147.94	177.61
1.100	58.93	88.60	118.27	147.94	177.61
1.400	58.93	88.60	118.27	147.94	177.61
1.700	58.93	88.60	118.27	147.94	177.61
2.000	58.93	88.60	118.27	147.94	177.61
		COST PER CHILD			
0.800	2.18	1.46	1.32	1.26	1.23
1.100	2.18	1.46	1.32	1.26	1.23
1.400	2.18	1.46	1.32	1.26	1.23
1.700	2.18	1.46	1.32	1.26	1.23
2.000	2.18	1.46	1.32	1.26	1.23

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
12.0000					
0.8000	0.9000				
1.0000	0.9000	0.7500			

Run #7

SQ FT COST	TUITION 0.800	1.100	1.400	1.700	2.000
SALES					
0.012	72.00	99.00	126.00	153.00	180.00
0.014	72.00	99.00	126.00	153.00	180.00
0.016	72.00	99.00	126.00	153.00	180.00
0.018	72.00	99.00	126.00	153.00	180.00
0.020	72.00	99.00	126.00	153.00	180.00
TOTAL COSTS					
0.012	117.86	117.86	117.86	117.86	117.86
0.014	118.38	118.38	118.38	118.38	118.38
0.016	118.90	118.90	118.90	118.90	118.90
0.018	119.42	119.42	119.42	119.42	119.42
0.020	119.94	119.94	119.94	119.94	119.94
PROFIT AFTER TAXES					
0.012	-49.06	-22.06	3.76	22.61	36.65
0.014	-50.10	-23.10	2.97	22.07	36.11
0.016	-51.14	-24.14	2.18	21.53	35.57
0.018	-52.18	-25.18	1.39	20.99	35.03
0.020	-53.22	-26.22	0.60	20.45	34.49
TOTAL ASSETS					
0.012	102.87	102.87	102.87	102.87	102.87
0.014	110.57	110.57	110.57	110.57	110.57
0.016	118.27	118.27	118.27	118.27	118.27
0.018	125.97	125.97	125.97	125.97	125.97
0.020	133.67	133.67	133.67	133.67	133.67
COST PER CHILD					
0.012	1.31	1.31	1.31	1.31	1.31
0.014	1.32	1.32	1.32	1.32	1.32
0.016	1.32	1.32	1.32	1.32	1.32
0.018	1.33	1.33	1.33	1.33	1.33
0.020	1.33	1.33	1.33	1.33	1.33

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0120	25.0000			
5.0000					
12.0000					
0.8000	0.9000				
5.0000	0.9000	0.7500			

*****

Run #8

CLASS ROOMS

TCH CST/CLAS	3.000	4.000	5.000	6.000	7.000
SALES					
8.000	91.80	122.40	153.00	183.60	214.20
12.000	91.80	122.40	153.00	183.60	214.20
16.000	91.80	122.40	153.00	183.60	214.20
20.000	91.80	122.40	153.00	183.60	214.20
24.000	91.80	122.40	153.00	183.60	214.20
FIXED COSTS					
8.000	20.00	20.00	20.00	20.00	20.00
12.000	20.00	20.00	20.00	20.00	20.00
16.000	20.00	20.00	20.00	20.00	20.00
20.000	20.00	20.00	20.00	20.00	20.00
24.000	20.00	20.00	20.00	20.00	20.00
CLASS COSTS					
8.000	29.25	39.00	48.75	58.50	68.25
12.000	41.25	55.00	68.75	82.50	96.25
16.000	53.25	71.00	88.75	106.50	124.25
20.000	65.25	87.00	108.75	130.50	152.25
24.000	77.25	103.00	128.75	154.50	180.25
CHILD COSTS					
8.000	15.55	20.74	25.92	31.10	36.29
12.000	15.55	20.74	25.92	31.10	36.29
16.000	15.55	20.74	25.92	31.10	36.29
20.000	15.55	20.74	25.92	31.10	36.29
24.000	15.55	20.74	25.92	31.10	36.29
TOTAL COSTS					
8.000	66.97	82.38	98.80	114.71	130.62
12.000	79.03	98.97	118.90	138.84	158.77
16.000	91.10	115.05	139.01	162.97	186.93
20.000	103.16	131.14	159.12	187.10	215.08
24.000	115.23	147.23	179.23	211.23	243.23
PROFIT BEFORE TAXES					
8.000	22.67	36.37	50.08	63.79	77.49
12.000	10.54	20.20	29.86	39.53	49.19
16.000	-1.59	4.03	9.65	15.27	20.89
20.000	-13.72	-12.15	-10.57	-8.99	-7.41
24.000	-25.85	-28.32	-30.78	-33.25	-35.72
PROFIT AFTER TAXES					
8.000	17.23	24.91	32.04	39.17	46.30
12.000	8.01	15.35	21.53	26.55	31.58
16.000	-1.59	3.06	7.33	11.60	15.87
20.000	-13.72	-12.15	-10.57	-8.99	-7.41
24.000	-25.85	-28.32	-30.78	-33.25	-35.72

Run #8 (continued)

TCH CST/CLAS	CLASS ROOMS 3.000	4.000	5.000	6.000	7.000
CASH FLOW					
8.000	13.48	21.16	28.29	35.42	42.55
12.000	4.26	11.60	17.78	22.80	27.83
16.000	-5.34	-0.69	3.58	7.85	12.12
20.000	-17.47	-15.90	-14.32	-12.74	-11.16
24.000	-29.60	-32.07	-34.53	-37.00	-39.47
TOTAL ASSETS					
8.000	87.64	102.16	116.67	131.19	145.70
12.000	88.60	103.44	118.27	133.11	147.94
16.000	89.56	104.72	119.87	135.03	150.18
20.000	90.52	106.00	121.47	136.95	152.42
24.000	91.48	107.28	123.07	138.87	154.66
TOTAL CAPITAL					
8.000	21.91	25.54	29.17	32.80	36.43
12.000	22.15	25.86	29.57	33.28	36.99
16.000	22.39	26.18	29.97	33.76	37.55
20.000	22.63	26.50	30.37	34.24	38.11
24.000	22.87	26.82	30.77	34.72	38.67
RETURN ON SALES					
8.000	18.76	20.35	20.94	21.33	21.61
12.000	8.72	12.54	14.07	14.46	14.74
16.000	-1.74	2.50	4.79	6.32	7.41
20.000	-14.95	-9.92	-6.91	-4.90	-3.46
24.000	-28.16	-23.14	-20.12	-18.11	-16.67
RETURN ON ASSETS					
8.000	19.65	24.39	27.46	29.86	31.77
12.000	9.04	14.84	18.20	19.95	21.35
16.000	-1.78	2.92	6.12	8.59	10.57
20.000	-15.16	-11.46	-8.70	-6.57	-4.86
24.000	-28.26	-26.40	-25.01	-23.94	-23.09
RETURN ON INVESTED CAPITAL					
8.000	78.62	97.55	109.85	119.43	127.10
12.000	36.15	59.37	72.81	79.80	85.38
16.000	-7.11	11.69	24.47	34.37	42.28
20.000	-60.64	-45.83	-34.80	-26.26	-19.46
24.000	-113.03	-105.59	-100.05	-95.78	-92.37
COST PER CHILD					
8.000	1.24	1.15	1.10	1.06	1.04
12.000	1.46	1.37	1.32	1.29	1.26
16.000	1.69	1.60	1.54	1.51	1.48
20.000	1.91	1.82	1.77	1.73	1.71
24.000	2.13	2.04	1.99	1.96	1.93

*****

Run #8 (continued)

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
8.0000					
1.7000	0.9000				
3.0000	0.9000	0.7500			

*****

Run #9

ENROLL RATE

TCH CST/CLAS	0.800	0.850	0.900	0.950	1.000
SALES					
8.000	136.00	144.50	153.00	161.50	170.00
12.000	136.00	144.50	153.00	161.50	170.00
16.000	136.00	144.50	153.00	161.50	170.00
20.000	136.00	144.50	153.00	161.50	170.00
24.000	136.00	144.50	153.00	161.50	170.00
FIXED COSTS					
8.000	20.00	20.00	20.00	20.00	20.00
12.000	20.00	20.00	20.00	20.00	20.00
16.000	20.00	20.00	20.00	20.00	20.00
20.000	20.00	20.00	20.00	20.00	20.00
24.000	20.00	20.00	20.00	20.00	20.00
CLASS COSTS					
8.000	48.75	48.75	48.75	48.75	48.75
12.000	68.75	68.75	68.75	68.75	68.75
16.000	88.75	88.75	88.75	88.75	88.75
20.000	108.75	108.75	108.75	108.75	108.75
24.000	128.75	128.75	128.75	128.75	128.75
CHILD COSTS					
8.000	23.04	24.48	25.92	27.36	28.80
12.000	23.04	24.48	25.92	27.36	28.80
16.000	23.04	24.48	25.92	27.36	28.80
20.000	23.04	24.48	25.92	27.36	28.80
24.000	23.04	24.48	25.92	27.36	28.80
TOTAL COSTS					
8.000	95.90	97.35	98.80	100.24	101.69
12.000	116.01	117.46	118.90	120.35	121.80
16.000	136.12	137.56	139.01	140.46	141.91
20.000	156.22	157.67	159.12	160.57	162.01
24.000	176.33	177.78	179.23	180.68	182.12
PROFIT BEFORE TAXES					
8.000	35.99	43.03	50.08	57.12	64.17
12.000	15.77	22.82	29.86	36.91	43.95
16.000	-4.44	2.60	9.65	16.69	23.74
20.000	-24.66	-17.61	-10.57	-3.52	3.52
24.000	-44.87	-37.83	-30.78	-23.74	-16.70
PROFIT AFTER TAXES					
8.000	24.71	28.38	32.04	35.70	39.37
12.000	11.99	17.34	21.53	25.19	28.85
16.000	-4.44	1.98	7.33	12.69	18.04
20.000	-24.66	-17.61	-10.57	-3.52	2.68
24.000	-44.87	-37.83	-30.78	-23.74	-16.70

*****

Run #9 (continued)

TCH CST/CLAS	ENROLL RATE 0.800	0.850	0.900	0.950	1.000
CASH FLOW					
8.000	20.36	24.63	28.29	31.95	35.62
12.000	8.24	13.59	17.78	21.44	25.10
16.000	-8.19	-1.77	3.58	8.94	14.29
20.000	-28.41	-21.36	-14.32	-7.27	-1.07
24.000	-48.62	-41.58	-34.53	-27.49	-20.45
TOTAL ASSETS					
8.000	116.44	116.56	116.67	116.79	116.90
12.000	118.04	118.16	118.27	118.39	118.50
16.000	119.64	119.76	119.87	119.99	120.10
20.000	121.24	121.36	121.47	121.59	121.70
24.000	122.84	122.96	123.07	123.19	123.30
TOTAL CAPITAL					
8.000	29.11	29.14	29.17	29.20	29.23
12.000	29.51	29.54	29.57	29.60	29.63
16.000	29.91	29.94	29.97	30.00	30.03
20.000	30.31	30.34	30.37	30.40	30.43
24.000	30.71	30.74	30.77	30.80	30.83
RETURN ON SALES					
8.000	18.17	19.64	20.94	22.11	23.16
12.000	8.31	12.00	14.07	15.60	16.97
16.000	-3.27	1.37	4.79	7.85	10.61
20.000	-18.13	-12.19	-6.91	-2.18	1.57
24.000	-33.00	-26.18	-20.12	-14.70	-9.82
RETURN ON ASSETS					
8.000	21.22	24.35	27.46	30.57	33.67
12.000	10.16	14.68	18.20	21.28	24.35
16.000	-3.71	1.65	6.12	10.57	15.02
20.000	-20.34	-14.51	-8.70	-2.90	2.20
24.000	-36.53	-30.77	-25.01	-19.27	-13.54
RETURN ON INVESTED CAPITAL					
8.000	84.90	97.39	109.85	122.29	134.70
12.000	40.62	58.71	72.81	85.12	97.40
16.000	-14.85	6.61	24.47	42.29	60.08
20.000	-81.35	-58.05	-34.80	-11.59	8.79
24.000	-146.12	-123.06	-100.05	-77.09	-54.16
COST PER CHILD					
8.000	1.20	1.15	1.10	1.06	1.02
12.000	1.45	1.38	1.32	1.27	1.22
16.000	1.70	1.62	1.54	1.48	1.42
20.000	1.95	1.85	1.77	1.69	1.62
24.000	2.20	2.09	1.99	1.90	1.82

*****

Run #9 (continued)

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
8.0000					
1.7000	0.9000				
5.0000	0.8000	0.7500			

*****

Run #10

TCH CST/CLAS	TUITION 0.800	1.100	1.400	1.700	2.000
		SALES			
8.000	72.00	99.00	126.00	153.00	180.00
12.000	72.00	99.00	126.00	153.00	180.00
16.000	72.00	99.00	126.00	153.00	180.00
20.000	72.00	99.00	126.00	153.00	180.00
24.000	72.00	99.00	126.00	153.00	180.00
		FIXED COSTS			
8.000	20.00	20.00	20.00	20.00	20.00
12.000	20.00	20.00	20.00	20.00	20.00
16.000	20.00	20.00	20.00	20.00	20.00
20.000	20.00	20.00	20.00	20.00	20.00
24.000	20.00	20.00	20.00	20.00	20.00
		CLASS COSTS			
8.000	48.75	48.75	48.75	48.75	48.75
12.000	68.75	68.75	68.75	68.75	68.75
16.000	88.75	88.75	88.75	88.75	88.75
20.000	108.75	108.75	108.75	108.75	108.75
24.000	128.75	128.75	128.75	128.75	128.75
		CHILD COSTS			
8.000	25.92	25.92	25.92	25.92	25.92
12.000	25.92	25.92	25.92	25.92	25.92
16.000	25.92	25.92	25.92	25.92	25.92
20.000	25.92	25.92	25.92	25.92	25.92
24.000	25.92	25.92	25.92	25.92	25.92
		TOTAL COSTS			
8.000	98.80	98.80	98.80	98.80	98.80
12.000	118.90	118.90	118.90	118.90	118.90
16.000	139.01	139.01	139.01	139.01	139.01
20.000	159.12	159.12	159.12	159.12	159.12
24.000	179.23	179.23	179.23	179.23	179.23
		PROFIT BEFORE TAXES			
8.000	-30.92	-3.92	23.08	50.08	77.08
12.000	-51.14	-24.14	2.86	29.86	56.86
16.000	-71.35	-44.35	-17.35	9.65	36.65
20.000	-91.57	-64.57	-37.57	-10.57	16.43
24.000	-111.78	-84.78	-57.78	-30.78	-3.78
		PROFIT AFTER TAXES			
8.000	-30.92	-3.92	17.54	32.04	46.08
12.000	-51.14	-24.14	2.18	21.53	35.57
16.000	-71.35	-44.35	-17.35	7.33	25.06
20.000	-91.57	-64.57	-37.57	-10.57	12.49
24.000	-111.78	-84.78	-57.78	-30.78	-3.78

*****

Run #10 (continued)

TUITION

TCH CST/CLAS	0.800	1.100	1.400	1.700	2.000
			CASH FLOW		
8.000	-34.67	-7.67	13.79	28.29	42.33
12.000	-54.89	-27.89	-1.57	17.78	31.82
16.000	-75.10	-48.10	-21.10	3.58	21.31
20.000	-95.32	-68.32	-41.32	-14.32	8.74
1S2S200888.53	L1.53	-34.53	-7.53		
			TOTAL ASSETS		
8.000	116.67	116.67	116.67	116.67	116.67
12.000	118.27	118.27	118.27	118.27	118.27
16.000	119.87	119.87	119.87	119.87	119.87
20.000	121.47	121.47	121.47	121.47	121.47
24.000	123.07	123.07	123.07	123.07	123.07
			TOTAL CAPITAL		
8.000	29.17	29.17	29.17	29.17	29.17
12.000	29.57	29.57	29.57	29.57	29.57
16.000	29.97	29.97	29.97	29.97	29.97
20.000	30.37	30.37	30.37	30.37	30.37
24.000	30.77	30.77	30.77	30.77	30.77
			RETURN ON SALES		
8.000	-42.95	-3.96	13.92	20.94	25.60
12.000	-71.02	-24.38	1.73	14.07	19.76
16.000	-99.10	-44.80	-13.77	4.79	13.92
20.000	-127.18	-65.22	-29.82	-6.91	6.94
24.000	-155.26	-85.64	-45.86	-20.12	-2.10
			RETURN ON ASSETS		
8.000	-26.50	-3.36	15.03	27.46	39.50
12.000	-43.24	-20.41	1.84	18.20	30.07
16.000	-59.52	-37.00	-14.48	6.12	20.90
20.000	-75.38	-53.15	-30.93	-8.70	10.28
24.000	-90.83	-68.89	-46.95	-25.01	-3.08
			RETURN ON INVESTED CAPITAL		
8.000	-106.01	-13.44	60.13	109.85	157.98
12.000	-172.94	-81.63	7.36	72.81	120.29
16.000	-238.09	-148.00	-57.90	24.47	83.61
20.000	-301.53	-212.62	-123.71	-34.80	41.12
24.000	-363.31	-275.56	-187.81	-100.05	-12.30
			COST PER CHILD		
8.000	1.10	1.10	1.10	1.10	1.10
12.000	1.32	1.32	1.32	1.32	1.32
16.000	1.54	1.54	1.54	1.54	1.54
20.000	1.77	1.77	1.77	1.77	1.77
24.000	1.99	1.99	1.99	1.99	1.99

Run #10 (continued)

ASSUMPTIONS

0.1000	35.0000	1.5000	1.0000	5.0000	
15.0000					
0.8000	0.6000	0.0	0.0		
0.1600	0.0500	0.0100	0.1000		
0.2400	0.4800	0.1000	20.0000	0.0900	0.0800
0.0	0.0160	25.0000			
5.0000					
8.0000					
0.8000	0.9000				
5.0000	0.9000	0.7500			

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APPENDIX III

DAYCARE PROGRAM DOCUMENTATION

CONTENTS

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1. INPUT DATA FILE

Lines 100 - 500: contain data which do not vary for the entire run of the program.

Line 600: control line for number of runs and type of output desired.

Lines 700 - 1100: decision variables which may be entered as a range of values. Two entries are required for each variable. If the entries are equal only one value is used. Two variables, and only two, must be entered as a range. The ranges will be divided into five equal parts.

Lines 1200 - 1600; etc.: groups of 5 lines of input similar in format to lines 700 - 1100. As many 5-line groupings are required as the number of runs specified in line 600.

Input the variables in the following format (see "variables" section for explanation of variable names).

Line	
100	RADSPA, SQFCHI, ACRES, EQPCST, STRCST
200	FIXSAL
300	CLACON, CLAMTN, CLATNG, CLAEXP, CLAUTL
400	CHIFOD, CHIMED, CHICLH, CHIEXP
500	TAXRT1, TAXRT2, DEPRAT, STUCLA, RATINT, WKCRAT
600	NRUNS, NOUT
700	FXAINV (1), FXAINV (2), SQFCST (1) SQFCST (2), ACRCST (1), ACRSCT (2)
800	FIXEXP (1), FIXEXP (2)
900	CLATSR (1), CLATSR (2)
1000	CHITUI (1), CHITUI (2), CHIATR (1), CHIATR (2)
1100	CLROOM (1), CLROOM (2), ENROLR (1), ENROLR (2), DTARAT (1), DTARAT (2)
1200	FXAINV (1), FXAINV (2), SQFCST (1), SQFCST (2),ACRSCT (1), ACRCST (2)
.	
.	
.	
.	
N	CLROOM (1), CLROOM (2), ENROLR (1), ENROLR (2), DTARAT (1), DTARAT (2)

where N = 600 + 5 x NRUNs

2. INPUT VARIABLES

Investment Variables

FXAINV	-	Fixed assets investment which, when added to working capital, makes up total assets. If input is positive, value will override calculation of FXAINV using variables below.
RADSPA	-	Ratio of administrative space required to classroom space planned (decimal)
SQFCHI	-	Square footage required per child
SQFCST	-	Cost per square foot of building
ACRES	-	Number of acres purchased
ACRCST	-	Cost per acre
EQPCST	-	Cost per classroom
STRCST	-	Other startup costs - fees and taxes - landscaping - market survey - planning - etc.

Fixed Annual Costs Variables

FIXEXP	-	Expenses
FIXSAL	-	Salaries

Classroom Variables

CLATSR	-	Teacher/student ratio expressed as cost per classroom per year
CLACON	-	Consumable equipment costs per year
CLAMTN	-	Classroom maintenance costs per year
CLATNG	-	Cost to train teachers per year
CLAUTL	-	Cost of utilities per year
CLAEXP	-	Expenses that are a function of classrooms per year otherthan above

Child Variables

CHIFOD	-	Cost of food per year
CHIMED	-	Medical, dental costs per year
CHICLH	-	Cost of extra clothing per year
CHIEXP	-	Miscellaneous expenses per year- mailings, insurance, etc.

CHITUI	-	Tuition per year
CHIATR	-	Attendance rate

Miscellaneous Variables

CLROOM	-	Number of classrooms
TAXRT1	-	Rate for earnings under $25,000
TAXRT2	-	Rate for earnings over $25,000
DEPRAT	-	Depreciation rate in year analyzed
ENROLR	-	Enrollment rate expressed as a % of capacity
STUCLA	-	Students per class
DTARAT	-	Debt as a percentage of total assets
RATINT	-	Interest rate on debt
WKCRAT	-	Working capital as ratio of total costs
NRUNS	-	Number of runs using different values for decision variables
NOUT	-	Type of output desired 1-short version 2-long version

Summary of Input Variables

	Decision	Fixed	Control
Investment	FXAINV	RADSPA	
	SQFCST	SQFCHI	
	ACRCST	ACRES	
		EQPCST	
		STRCST	
Fixed Costs	FIXEXP	FIXSAL	
Class Costs	CLATSR	CLACON	
		CLAMTN	
		CLATNG	
		CLAEXP	
		CLAUTL	
Child Costs	CHITUI	CHIFOD	
	CHIATR	CHIMED	
		CHICLH	
		CHIEXP	
Miscellaneous	CLROOM	TAXRT1	NRUNS
	ENROLR	TAXRT2	NOUT
	DTARAT	DEPRAT	
		STUCLA	
		RATINT	
		WKCRAT	

3. OUTPUT VARIABLES

SALES	-	Total sales in period
FIXCST	-	Fixed annual costs
CLACST	-	Class related costs
CHICST	-	Child related costs
TOTCST	-	Total of above three
PBT	-	Profit before taxes
PAT	-	Profit after taxes
CSHFLO	-	Net cash flow in period
TOTASS	-	Total assets
TOTCAP	-	Total capital investment
ROS	-	Return on sales
ROA	-	Return on assets
ROCI	-	Return on capital investment
CSTPCH	-	Cost per child

Each of the above is output as a 5 x 5 array whose columns and rows are determined by the choice of two input (decision) variables.

All dollar values are in thousands. Rates of return are in percentages.

4. PROCESSING VARIABLES

A(I) - First value in range for decision variables

I =
1. Fixed asset investment (FXAINV)
2. Square foot build cost (SQFCST)
3. Acreage cost (ACRCST)
4. Fixed annual expense (FIXEXP)
5. Teacher student ratio (CLATSR)
6. Tuition rate (CHITUI)
7. Attendance rate (CHIATR)
8. No. of classrooms (CLROOM)
9. Enrollment rate (ENROLR)
10. Debt to assets rate (DTARAT)

B(I) - Last value in range for decision variables with I same as in A(I)

C(I) - Incremental value to get from A(I) to B(I) in five equal increments for I same as in A(I)

OUTI(I) - Array used to print out the decision variables column headings I=I, 5

OUTJ(I) - Array used to print out the decision variable row headings

IVI - Used to test validity of ranges of decision variables

AV(I, J) - Matrix which contains the names of the variables used to title column and row headings in the output

SI(I), SJ(I) - Switch variables to identify which of 10 decision variables have been input as a range of values. I=1, 10 same as A(I)

FINV - Value of fixed investment which equals either calculated value or FXAINV input

```
LOAD DAYCAR
#
LIST
200         DIMENSION TOTASS(5,5),TOTCAP(5,5),CSTPCH(5,5)
300         DIMENSION FIXCST(5,5),CLACST(5,5),CHICST(5,5),OCCCST(5,5)
400         DIMENSION SALES(5,5),PBT(5,5),PAT(5,5),AV(10,3)
500         DIMENSION TOTCST(5,5),CSHFLO(5,5),ROS(5,5),ROA(5,5),ROCI(5,5)

600    DIMENSION A(10),B(10),C(10),D(10),SI(10),SJ(10),OUTI(5),OUTJ(5)
620 DATA AV(1,1),AV(1,2),AV(1,3)/'FIXE','D AS','SETS'/
622 DATA AV(2,1),AV(2,2),AV(2,3)/'SQ F','T CO','ST  '/
624 DATA AV(3,1),AV(3,2),AV(3,3)/'ACRE',' COS','T   '/
626 DATA AV(4,1),AV(4,2),AV(4,3)/'FIXE','D EX','P   '/
628 DATA AV(5,1),AV(5,2),AV(5,3)/'TCH ','CST/','CLAS'/
630 DATA AV(6,1),AV(6,2),AV(6,3)/'TUIT','ION ','    '/
640 DATA AV(7,1),AV(7,2),AV(7,3)/'ATTE','ND R','ATE '/
642 DATA AV(8,1),AV(8,2),AV(8,3)/'CLAS','S RO','OMS '/
644 DATA AV(9,1),AV(9,2),AV(9,3)/'ENRO','LL R','ATE '/
646 DATA AV(10,1),AV(10,2),AV(10,3)/'DEBT','/ASS','ET
700         READ (5,*) RADSPA,SQFCHI,ACRES,EQPCST,STRCST
800         READ (5,*) FIXSAL
900         READ (5,*) CLACON,CLAMTN,CLATNG,CLAEXP,CLAUTL
1000         READ (5,*) CHIFOD,CHIMED,CHICLH,CHIEXP
1100         READ (5,*) TAXRT1,TAXRT2,DEPRAT,STUCLA,RATINT,WKCRAT
1200 READ (5,*) NRUNS,NOUT
1300  DO 4010 N=1,NRUNS
1400         READ (5,*) A(1),B(1),A(2),B(2),A(3),B(3)
1600         READ (5,*) A(4),B(4)
1800         READ (5,*) A(5),B(5)
2000         READ (5,*) A(6),B(6),A(7),B(7)
2200         READ (5,*) A(8),B(8),A(9),B(9),A(10),B(10)
3140    DO 100 I=1,10
3160    SI(I)=0
3180    100   SJ(I)=0
3200         IVI=0
3300         DO 1630 I=1,10
3400         IF (A(I).GT.B(I)) GO TO 4000
3500         C(I)=(B(I)-A(I))/4
3600         IF (C(I).EQ.0) GO TO 1630
3700         IF (IVI.GT.0)GO TO 1580
3800         DO 1560 J=1,5
3900 1560   OUTJ(J) = A(I)+C(I)*(J-1)
3950 SJ(I)=1
4000         IVI=IVI+1
4100         GO TO 1620
4200 1580   DO 1590 J=1,5
4300 1590   OUTI(J)=A(I)+C(I)*(J-1)
4350 SI(I)=1
4400         IVI=IVI+1
4800 1620   B(I)=A(I)+4.9*C(I)
4900 1630   CONTINUE
5000         IF (IVI.NE.2) GO TO 4000
5100  DO 2200 I=1,5
5200  DO 2200 J=1,5
```

```
5300  DO 1800 K=1,10
5400  1800  D(K)=A(K)+(SI(K)*(I-1)+SJ(K)*(J-1))*C(K)
5500 FXAINV=D(1)
5600 SQFCST=D(2)
5700 ACRCST=D(3)
5800 FIXEXP=D(4)
5900 CLATSR=D(5)
6000 CHITUI=D(6)
6100 CHIATR=D(7)
6200 CLROOM=D(8)
6300 ENROLR=D(9)
6400 DTARAT=D(10)
6600        CSTLND=0
6800        CSTBLD=(1+RADSPA)*CLROOM*STUCLA*SQFCHI*SQFCST
6900        CSTLND=ACRCST*ACRES
7000        CSTEQP=EQPCST*CLROOM
7100  IF(FXAINV.NE.0) GO TO 1993
7120  FINV=CSTBLD+CSTLND+CSTEQP
7140 GO TO 1995
7160  1993  FINV=FXAINV
7200 1995  FIXCST(I,J)=FIXEXP+FIXSAL
7300        AAA=CLATSR+CLATNG+CLAMTN+CLACON+CLAEXP
7400        CLACST(I,J)=CLROOM*(AAA+STUCLA*SQFCHI*CLAUTL)
7500        BBB=CHIFOD+CHIMED+CHICLH+CHIEXP
7600        CHICST(I,J)=CHIATR*STUCLA*CLROOM*BBB*ENROLR
7700        CSTBID=FIXCST(I,J)+CLACST(I,J)+CHICST(I,J)
7800   TOTASS(I,J)=FINV+WKCRAT*CSTBID+STRCST
7900        TOTCAP(I,J)=(1-DTARAT)*TOTASS(I,J)
8000        EXPINT=RATINT*DTARAT*TOTASS(I,J)
8100        DEPR=DEPRAT*(FXAINV-CSTLND)
8150 TOTCST(I,J)=CSTBID+EXPINT+DEPR
8170 CSTPCH(I,J)=TOTCST(I,J)/(CLROOM*STUCLA*ENROLR)
8200        SALES(I,J)=CHITUI*ENROLR*STUCLA*CLROOM
8300        PBT(I,J)=SALES(I,J)-TOTCST(I,J)-DEPR-EXPINT
8500        IF (PBT(I,J).LE.25) GO TO 2100
8600        PAT(I,J)=PBT(I,J)-(TAXRT1*25+TAXRT2*(PBT(I,J)-25))
8700        GO TO 2140
8800 2100  IF(PBT(I,J).LE.0) GO TO 2130
8900        PAT (I,J)=PBT(I,J)*(1-TAXRT1)
9000        GO TO 2140
9100 2130  PAT(I,J)=PBT(I,J)
9200 2140  CONTINUE
9300        CSHFLO(I,J)=PAT(I,J)+DEPR
9500        ROS(I,J)=(PAT(I,J)/SALES(I,J))*100
9600        ROA(I,J)=(PAT(I,J)/TOTASS(I,J))*100
9700        ROCI(I,J)=(PAT(I,J)/TOTCAP(I,J))*100
9800 2200  CONTINUE
9810 DO 2300 I=1,10
9820 IF(SJ(I).EQ.1) JJ=I
9830 IF(SI(I).EQ.1) II=I
9840 2300 CONTINUE
9845 PRINT 140
9850 PRINT 200,(AV(II,J),J=1,3)
```

```
9860 PRINT 210,(AV(JJ,J),J=1,3)
9900       PRINT 400,(OUTI(I),I=1,5)
9950 PRINT 220
10000       CALL PRNT(OUTJ,SALES)
10050 IF(NOUT.EQ.1) GO TO 3200
10070 PRINT 230
10100       CALL PRNT(OUTJ,FIXCST)
10170 PRINT 240
10200       CALL PRNT(OUTJ,CLACST)
10270 PRINT 250
10300       CALL PRNT(OUTJ,CHICST)
10350 3200 PRINT 260
10400       CALL PRNT(OUTJ,TOTCST)
10450 IF(NOUT.EQ.1) GO TO 3300
10470 PRINT 270
10500       CALL PRNT(OUTJ,PBT)
10550 3300 PRINT 280
10600       CALL PRNT(OUTJ,PAT)
10650 IF(NOUT.EQ.1) GO TO 3400
10652 PRINT 150
10654 PRINT 140
10656 PRINT 200,(AV(II,J),J=1,3)
10658 PRINT 210,(AV(JJ,J),J=1,3)
10660 PRINT 400,(OUTI(I),I=1,5)
10670 PRINT 290
10700       CALL PRNT(OUTJ,CSHFLO)
10750 3400 PRINT 300
10800       CALL PRNT(OUTJ,TOTASS)
10850 IF(NOUT.EQ.1) GO TO 3600
10870 PRINT 310
10900       CALL PRNT(OUTJ,TOTCAP)
10970 PRINT 320
11100       CALL PRNT(OUTJ,ROS)
11150  PRINT 330
11200       CALL PRNT(OUTJ,ROA)
11250
11270 PRINT 340
11300       CALL PRNT(OUTJ,ROCI)
11301 3600 PRINT 345
11302 CALL PRNT(OUTJ,CSTPCH)
11304 IF(NOUT.EQ.1) GO TO 3700
11306  PRINT 150
11308 PRINT 140
11309 3700 CONTINUE
11310 PRINT 350
11320 PRINT 360,RADSPA,SQFCHI,ACRES,EQPCST,STRCST
11330 PRINT 360,FIXSAL
11340 PRINT 360,CLACON,CLAMTN,CLATNG,CLAEXP
11350 PRINT 360,CHIFOD,CHIMED,CHICLH,CHIEXP
11360 PRINT 360,TAXRT1,TAXRT2,DEPRAT,STUCLA,RATINT,WKCRAT
11365 PRINT 150
11370 PRINT 360,A(1),A(2),A(3)
11380 PRINT 360,A(4)
```

```
11390 PRINT 360,A(5)
11400 PRINT 360,A(6),A(7)
11410 PRINT 360,A(8),A(9),A(10)
11414  PRINT 140
11420  GO TO 4010
11500 4000  PRINT 420
11600 4010  CONTINUE
11610 140 FORMAT(//,1X,'*****',///)
11620 150 FORMAT(1X)
11700 200 FORMAT(22X,3A4)
11750 210 FORMAT(1X,3A4)
11800 220 FORMAT(/,22X,'SALES',/)
11850 230 FORMAT(/,22X,'FIXED COSTS',/)
11900 240 FORMAT(/,22X,'CLASS COSTS',/)
11950 250 FORMAT(/,22X,'CHILD COSTS',/)
12000 260 FORMAT(/,22X,'TOTAL COSTS ',/)
12050 270 FORMAT(/,22X,'PROFIT BEFORE TAXES',/)
12100 280 FORMAT(/,22X,'PROFIT AFTER TAXES',/)
12150 290 FORMAT(/,22X,'CASH FLOW',/)
12200 300 FORMAT(/,22X,'TOTAL ASSETS',/)
12250 310 FORMAT(/,22X,'TOTAL CAPITAL',/)
12300 320 FORMAT(/,22X,'RETURN ON SALES',/)
12350 330 FORMAT(/,22X,'RETURN ON ASSETS',/)
12400 340 FORMAT(/,22X,'RETURN ON INVESTED CAPITAL',/)
12450 345 FORMAT(/,22X,'COST PER CHILD',/)
12500 350 FORMAT(//,6X,'ASSUMPTIONS',//)
12550 360 FORMAT(1X,6F11.4)
12800 400   FORMAT(11X,5F8.3)
12900 420   FORMAT(/,' INCORRECT INPUT')
13000 STOP
13100       END
13200       SUBROUTINE PRNT(OUT1,OUT2)
13300       DIMENSION OUT1(5),OUT2(5,5)
13400       DO 9830 J=1,5
13500 9830  PRINT 50,(OUT1(J),(OUT2(I,J),I=1,5))
13700 50    FORMAT(1X,F8.3,2X,5F8.2)
13900       RETURN
14000       END
```

POTENTIAL ECONOMIC BENEFITS

OF INDUSTRIAL DAY CARE

POTENTIAL ECONOMIC BENEFITS OF INDUSTRIAL DAY CARE

Introduction

Proponents of industrial day care argue that, while the cost of quality day care is high, the potential benefits more than offset the costs. Specifically, they argue that industry-related day care will provide:

> Benefits to Children. We now know that (1) substantial intellectual development occurs before the start of formal education, (2) children from disadvantaged families often start school with appreciable physical and mental learning disabilities, and (3) compensatory education is probably more expensive (and less effective) than early childhood programs.
>
> Benefits to Society. Subsidized child care would allow many mothers to obtain employment and thus make a positive economic contribution to society (rather than require welfare support) as well as to her family.
>
> Benefits to Industry. Existing data suggest that some types of private industry would benefit financially by providing subsidized child care to low-income employees.

This paper focuses entirely on the potential benefits to industry. In fact, the analytical framework proposed in this paper identifies only the quantifiable economic benefits that might accrue to a corporation which provides subsidized child care to its employees. Other benefits -- such as improved publicity and corporate image -- might produce long range economic gains, but they are not included in this analysis.

The Growth of Absenteeism and Turnover

Absenteeism and turnover in some segments of the labor force have increased significantly in recent years. Increases have been particularly high among low-skilled, low-income, inner city, and female employees. Annual turnover rates of 20-40% of the total labor force are not unusual in some industries.

.. A recent survey of 2,300 businesses conducted by the Administrative Management Society indicates that turnover among office personnel rose to 26% in 1969, up from 24% recorded in 1967. The turnover rate for women increased to 35% in 1969 from 32% in 1967. Retail supply companies were hardest hit with average turnover rates of 35%, up sharply from 25% recorded two years earlier.

.. Some corporations with a high percentage of female employees experience turnover rates in some plants in excess of 100% per year.

.. Two textile manufacturers report turnover rates of 72-90% of the labor force each year.

In addition to turnover, absenteeism is also on the rise in American industry, particularly among the low-skilled, the female, and the inner city employee. Meaningful statistical data related to absenteeism are difficult to obtain because few absent employees actually report in as such. Nevertheless:

.. Business Week recently reported that General Motors is experiencing absenteeism that is "twice as high as a few years ago"*. An absenteeism rate of 13-15% of the labor force is fairly common for auto plants. Approximately 3-5% is actually accounted for by normal illnesses and emergencies -- the remainder is largely unexplained.

.. The Bureau of National Affairs (BNA) recently analyzed absenteeism in about 250 companies of all sizes. They found that recent high rates of unemployment have had little noticeable impact on absenteeism.** The threat

* Business Week; July 25, 1970, p. 66
** Business Week; op. cit.

of losing one's job appears to be a relatively unimportant factor in determining absenteeism. The BNA study showed that absenteeism has less to do with job and job-related factors than the employee's personal problems. Over 70% of the companies surveyed reported "injury and illness" as the primary reason given for absenteeism. However, they also indicated that other factors such as transportation, marital difficulties and child care were important contributors to increased absenteeism.

The Cost of Absenteeism and Turnover

The cost of increased turnover and absenteeism is growing both as a result of the absolute increase in the rates at which they occur as well as structural changes in American business itself. The complexity and skill requirements of modern technology have increased the need for expensive classroom and on-the-job training courses. High turnover rates among this type of trained personnel frequently involve substantial costs ($1,000 - $5,000 per employee). In addition, many corporations have adopted liberalized medical and sick leave plans which increase the cost of absenteeism when used for absences unrelated to medical problems. These factors, when combined with sharp increases in the absolute rates of turnover and absenteeism, have cut profits and productivity in many industries and forced corporations to develop programs to reduce turnover and absenteeism to more normal levels.

Day Care --- A Potential Remedy

In an effort to reduce absenteeism and turnover, some corporations have investigated the possibility of subsidizing day care services for children of company employees. The principal assumptions underlying these programs are (1) that a significant amount of turnover and absenteeism is the result of inadequate care available for children of employees and (2) that the provision of subsidized child care services will reduce this child-related turnover and absenteeism.

Neither of these two assumptions have yet been effectively tested. However, there is little doubt that many (particularly female) employees leave their jobs as a result of pregnancy or to care for existing children who are unable to attend suitable child care programs. In addition, absenteeism (particularly among

female employees) is frequently caused by inadequate or unavailable day or after school care services. In spite of these generally held beliefs, the major unresolved issues are (1) to what degree child care requirements affect turnover and absenteeism, and (2) the potential reductions that could be achieved by providing subsidized day and after school care for children of corporate employees.

However, the results of several field experiments indicate the potential economic benefits are substantial. For example,

.. the Vanderbilt Shirt Company (N.C.) reports that turnover among mothers with children in the corporate day care center is "practically nil" while women employees not using the day care center have turnover rates of 72%. Turnover costs are about $1,000 per employee. *

.. Mr. Apparel, another textile company, reports "absolutely zero" turnover among women using the center compared to 80-90% among other employees. Turnover costs are estimated at $1,500 per lost employee. *

.. the Sony Corporation in Japan -- which provides day care for employee's children -- reports turnover rates of 16% per year compared to 40-50% for similar companies without day care. Sony's absenteeism declined to 6% per employee per year with day care compared to 20-30% before the center was available. ** Similar Japanese companies without day care also report absenteeism rates of 20-30%.

---

* Proceedings of the Conference on Industry and Day Care, Urban Research Corporation, Chicago, 1970

** Letter to U.S. Department of Labor from Shigeru Kubayashi, Managing Director, Sony Corporation, December 18, 1970.

These issues can be fully resolved only by detailed and widespread field experiments, data collection, and evaluation. However, it is possible to evaluate the potential savings within a range of reasonable assumptions about the impact of subsidized child care on corporate turnover and absenteeism. The following model identifies the relevant factors, estimates their probable ranges, and calculates the potential savings associated with subsidized child care programs for corporate employees.

A Framework to Analyze Potential Savings

The following model develops an analytical framework to determine the potential savings of industrial day care. Like all quantitative approximations of reality, this model has several weaknesses. Specifically:

.. the model assumes a linear relationship between the relevant factors. This may be a poor assumption, but there is no existing information which indicates there are important non-linear relationships involved.

.. it is oriented toward an industry with a high concentration of female and low to moderately skilled employees. The model thus implicitly assumes that females normally have primary responsibility for young children and that they (rather than their husbands) leave their jobs to care for children when the need arises.

.. the model does not consider several factors which might produce appreciable economic benefits. For example, productivity would undoubtedly increase if subsidized child care attracted higher quality employees or if a more stable labor force could operate more efficiently. Some reduction in supervisory personnel might also be possible with a more experienced labor force. These factors are not considered in this paper, not because they are unimportant, but rather because so little reliable data are available.

.. the model requires a wide variety of empirical data inputs (or at least reasonable estimates). Few corporations have the type of detailed data required by the model. Nevertheless, on the basis of some current empirical experiments, it may soon be possible to develop estimating relationships which will enable any corporation to convert common employment data related to the size, location, sex, racial, income and skill composition of its labor force into estimates of the number of eligible children and the potential savings from day care.

The factors included in the day care model are shown on the following pages. Estimates of the potential range of each factor are based on empirical data collected by a large employer as well as projections by the author. While these data may not accurately reflect American industry, they are based on actual experience and reasonable estimates and reflect potential savings in some industrial operations.

DAY CARE COST MODEL

		Potential Range Low	High
Number of Eligible Children			
PSIZ	Number of employees in plant or corporation	1,000	1,000
PWC	Percentage of employees with primary responsibility for children age 2-6	15%	40%
A	Number of children age 2-6 per eligible family	1.0	1.5
NEC	Number of eligible children in the plant or corporation	150	600
Amount of Turnover			
ATR	Annual turnover rate; percentage of average labor force hired each year	25%	60%
ATRC	Percentage of annual turnover caused by children age 2-6	10	30
TATC	Total new hires needed annually because of children age 2-6	25	180
Amount of Absenteeism			
AAR	Days of absenteeism per employee per year	5	30
AARC	Percentage of AAR related to children age 2-6	20	50
TAAC	Total absenteeism; days of absenteeism due to children age 2-6	1,000	15,000

		Potential Range Low	High
Cost of Turnover $			
TC	Training cost (incremental) of each new employee. Includes trainee's salary, equipment, space costs, trainor's salary, and any other out-of-pocket expenses	1,000	3,400
AC	Administrative cost per new employee. Includes estimate of all overhead that would be eliminated by reducing turnover	50	100
PC	Productivity cost due to inexperience	400	500
C1	Total cost of each new hire	1,450	4,000
Cost of Absenteeism $			
CS	Cost of daily salary of absent employee	15	25
CR	Cost of daily salary or overtime payments of replacement personnel	20	30
CP	Cost of low productivity of replacement personnel	2	3
CA	Cost of overhead to administer one day of absenteeism	1	1
C2	Total cost per day of absenteeism	38	59
Total Cost of Absenteeism and Turnover $			
TCAT	Total cost of turnover related to children age 2-6	36,250	720,000
TCAA	Total cost of absenteeism related to children age 2-6	38,000	885,000

		Potential Range Low	High
Potential Savings $			
RT	Percentage reduction in ATRC as a result of industrial day care	30	60
RA	Percentage reduction in AARC as a result of industrial day care	30	60
S1	Total savings by reducing turnover	10,875	432,000
S2	Total savings by reducing absenteeism	11,400	531,000
PCS1	Turnover savings per eligible child	451	720
PCS2	Absenteeism savings per eligible child	76	885
TPCS	Total savings per eligible child	227	1,605

Conclusions

This analysis of the potential economic benefits of industrial day care suggests that some corporations could profitably invest time and resources to improve the child care services available to their employees. The low range of estimates suggests that the hypothetical plant considered should be willing to spend up to $227 per year for each eligible child (age 2-6) of corporate employees. This assumes that child related turnover and absenteeism could be reduced by 30%. Under the high (optimistic) range of estimates, the plant should be willing to pay up to $1,605 per year per eligible child.

These estimates are average figures. Each corporation will undoubtedly cover a wide spectrum of eligible children ranging from low to moderate income employees. Thus, most corporations would probably design a sliding fee schedule -- based on family income -- which would provide larger subsidies to the poor than the wealthy. Under this type of arrangement, for example, the plant might pay $200 per year for children from families earning over $7,000 and up to $800 per year for children with less than $6,999 annual family income. Under the high range of estimates, the corporate subsidy might run from $500 to $2,000 per year depending on family income. In any event, the use of a sliding fee structure will permit a corporation to include a wider range of its employee population in its subsidized child care program.

Appendix 1

Model Equations

The following equations are used to solve for the factors discussed previously. The number of eligible children (NEC) in a plant or corporation is equal to the number of employees (PSIZ) times the percentage of employees with children age 2-6 (PWC) times the average number of children age 2-6 per eligible family (A).

$$NEC = (PSIZ)(PWC)(A)$$

The total annual turnover -- in terms of new hires required -- related to child care (TATC) is equal to the annual turnover rate for the plant (ATR) times the percentage of that rate that is caused by children age 2-6 (ATRC) times the number of employees (PSIZ).

$$TATC = (ATR)(ATRC)(PSIZ)$$

The total annual absenteeism in days related to child care (TACC) is equal to the annual absenteeism rate per employee (AAR) times the percentage of that rate that is caused by children age 2-6 (AARC) times the number of employees (PSIZ).

$$TAAC = (AAR)(AARC)(PSIZ)$$

The cost of turnover per employee that leaves (C1) is equal to the incremental cost of any classroom or on-the-job training received (TC) plus the administrative cost to hire and process the employee (AC) plus the cost of productivity lost while the employee was acquiring the skills needed to operate efficiently (PC).

$$C1 = TC + AC + PC$$

The cost of absenteeism per day per employee (C2) is equal to the cost of that individual's salary (CS) -- because most "absences" are covered by sick leave pay -- plus the cost of the salary to hire a replacement worker or pay overtime to other employees (CR), plus the cost of productivity lost by using less experienced workers (CP), plus the cost of administering the absent employee and his replacement.

$$C2 - CS + CR + CP + CA$$

The total cost of turnover each year (TCAT) is equal to the total turnover related to child care (TATC) times the cost of turnover for each employee that leaves (C1).

$$TCAT = (TATC)(C1)$$

The total cost of absenteeism each year (TCAA) is equal to the total absenteeism each year related to child care (TAAC) times the cost of absenteeism per worker per day (C2).

$$TCAA = (TAAC)(C2)$$

The potential turnover savings from subsidized industrial day care (S1) are equal to the total cost of turnover related to young children (TCAT) minus the cost of turnover after the day care is available. The cost of turnover after day care is available is equal to the total cost of day care prior to the new program times one minus the potential percentage reduction in the turnover rate as a result of the day care program.

$$S1 = TCAT - \overline{/}(TATC)(C1)(1-RT)\overline{/}$$

The potential absenteeism savings from subsidized day care (S2) are equal to the total cost of absenteeism (TCAA) minus the cost of absenteeism after the day care is available. The cost of absenteeism after day care is available is equal to the total cost of absenteeism prior to the new program times one minus the potential percentage reduction in the absenteeism rate as a result of the day care program.

$$S2 = TCAA - \overline{/}(TAAC)(C2)(1-RA)\overline{/}$$

The potential savings per eligible child of reducing turnover (PCS1) are equal to the total turnover savings (S1) divided by the number of eligible children (NEC).

$$PCS1 = S1 \div NEC$$

The potential savings per eligible child of reducing absenteeism (PCS2) are equal to the total savings from lower absenteeism (S2) divided by the number of eligible children (NEC).

$$PCS2 = S2 \div NEC$$

The total savings per eligible child (TPCS) are equal to the per capita turnover savings (PCS1) plus the per capita absenteeism savings (PCS2).

$$TPCS = PCS1 + PCS2$$